

JAXA's Engineering Effort for Human Error Prevention

To Improve Effectivity of Launch Site Facility Maintenance
by “PSF Management”

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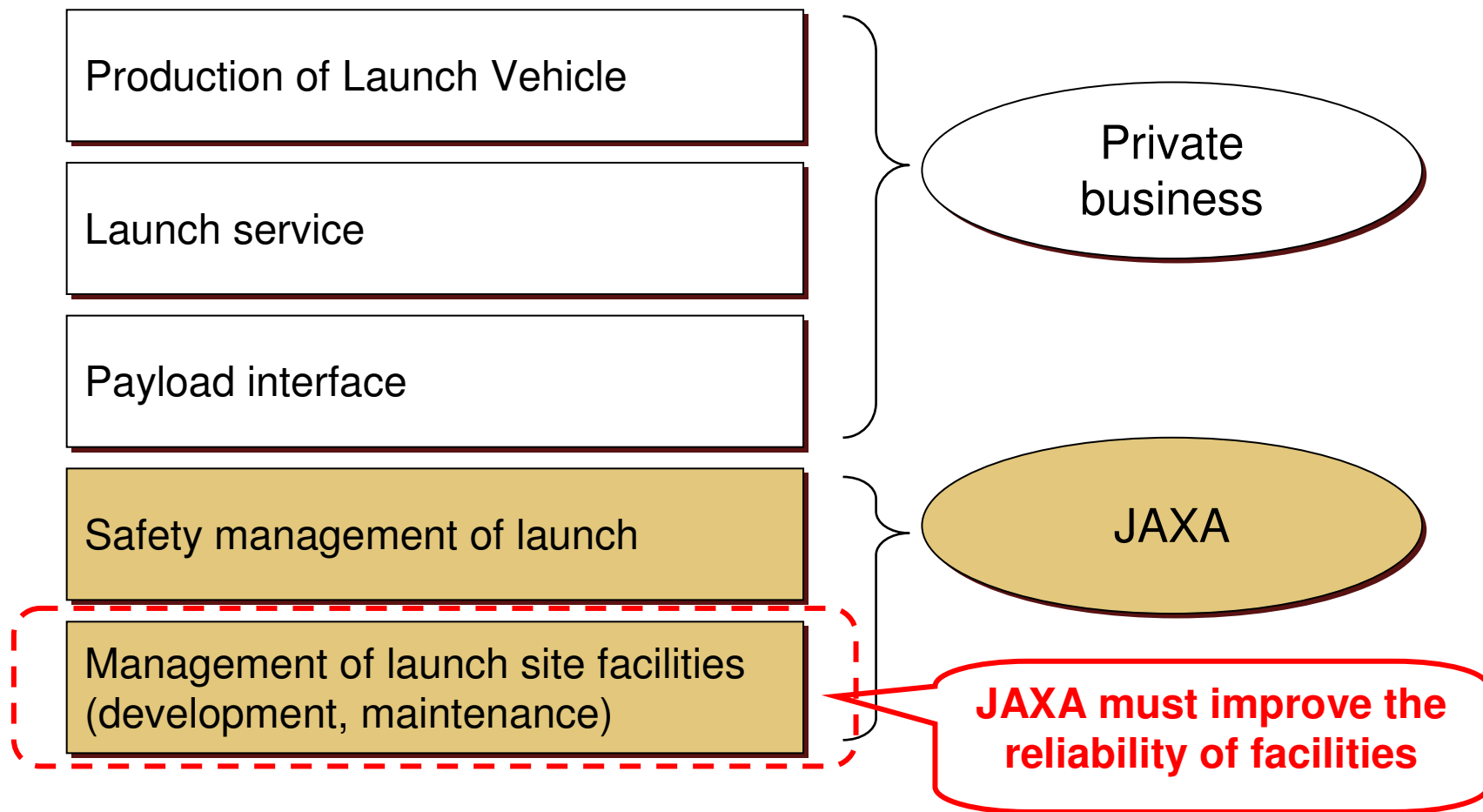
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1. INTRODUCTION

- The trouble of launch site facility and the non-efficiency maintenance gives bad influence to launch schedule and launch operation.
- Therefore, we want to improve efficiency of maintenance as well as the prevention of trouble.
- We paid attention to human error that is one of causes of the trouble and the non-efficiency.
- "The PSF management" is said to one of effective method which prevents of human error.
- We tried to apply to PSF management method in a facility in JAXA.
- The maintenance became effective when we applied PSF management method to maintenance of the facility as a result of trial. .

BACKGROUND



2. What is PSF MANAGEMENT ?

2. What is PSF MANAGEMENT ?

PSF : Performance Shaping Factor

in a simple term... Various matters to interfere
with worker's activity

Example...

- Matters to interfere with efficiency
- Dangerous matters
- Matters of Physiological or Psychological burden
- Nasty things
- Matters that becomes origin of human error etc...

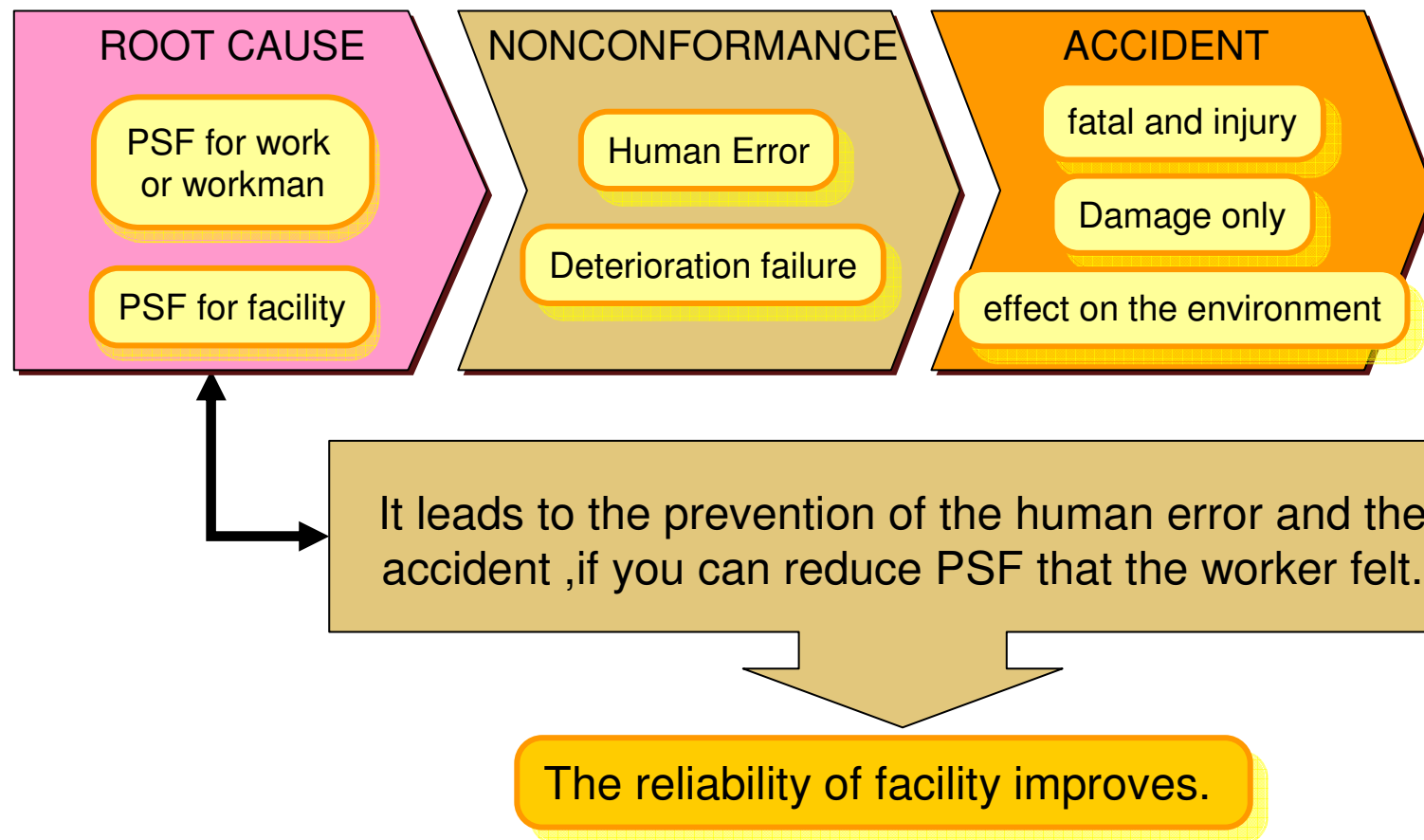
2. What is PSF MANAGEMENT ?

Reactive / Proactive on Human Error

	Reactive	Proactive
Target	Active error Reactive factors	Potential error Proactive factors
Range of work	limited in scope of target	Widely
Activity	Rout out and analysis	PSF management
Outcome	Repair the defect and prevent similar one	Formulation of the structure

CONCEPT of Prevent

From the viewpoint of preventing the accident and nonconformance occurring beforehand, PSF are actualized and reduce for maintaining and operating of facilities that JAXA has.



What is “PSF MANAGEMENT” ?

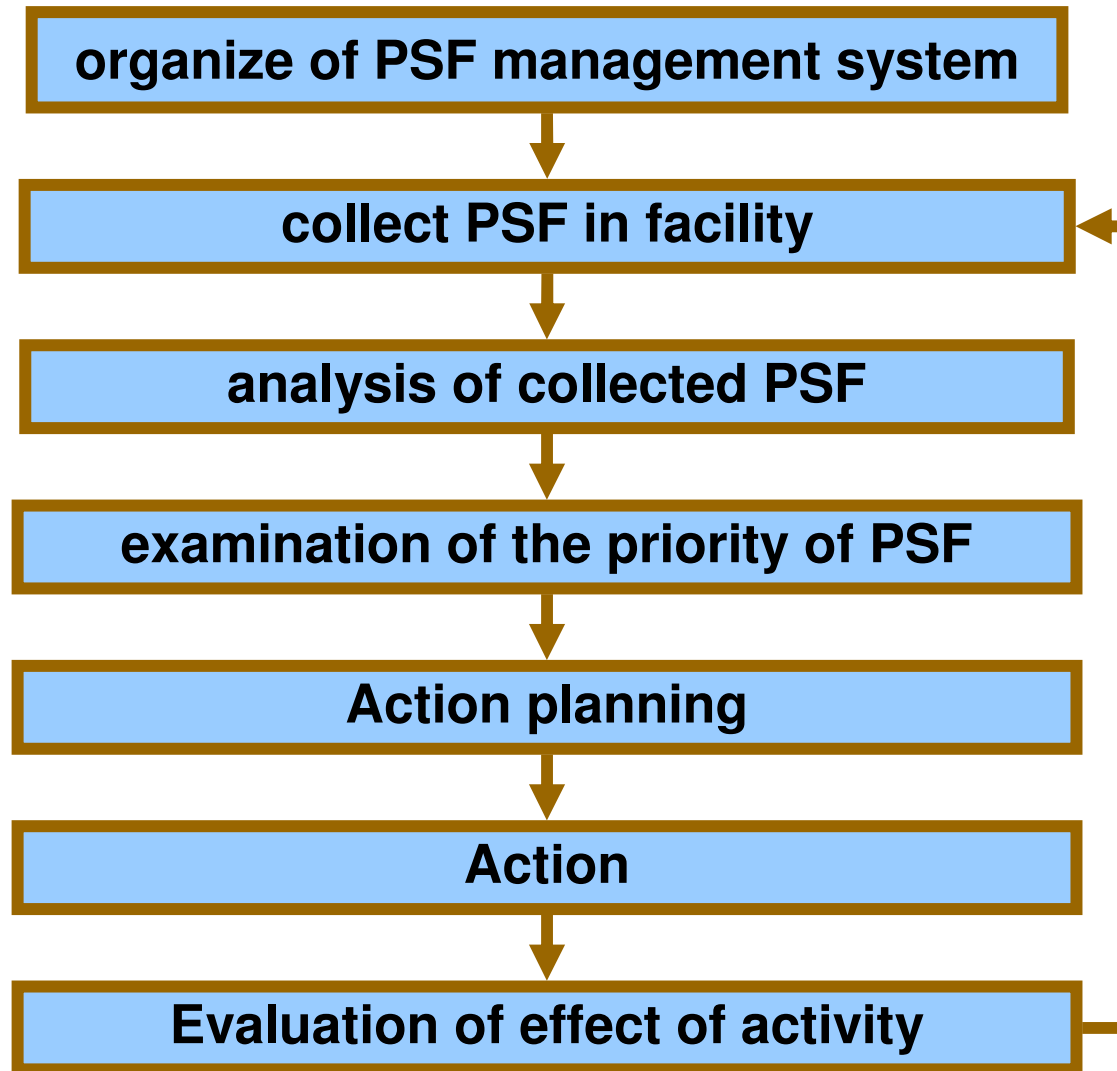
DEFINITION

PSF management is to achieve improvement of work efficiency, prevention of human error , cost reduction, etc by eliminating or reducing PSF.

AIM of ACTIVITY

- a) Reliability improvement of office or work
- b) Reduction in useless workload/task , improvement of work efficiency
- c) prevention of human error , cost reduction
- d) Prevention of accident and industrial injury

PSF MANAGEMENT FLOW



3 . Trial of PSF management in JAXA

We tried to apply to PSF management method in a facility in JAXA, and inspected

3 . Trial of PSF management in JAXA

TRIAL (FRAMEWORK)

(1) PLAN

setup of the target

**(2) DO
(Search)**

Development of the PSF Reference list

Search the PSF that worker have

Analysis

(3) CHECK

**Execution of action
Evaluation of effect**

(1) PLAN

TARGET FACILITY

Three facilities at TANEGASHIMA SPACE CENTER

- a. High Pressure Gas Storage
- b. Movable Launcher
- c. Power Supply Facilities

INVESTIGATION PERIOD

About a month

(2) DO(SEARCH)

SURVEY FORM

- Development of the PSF Reference List

< Sample of PSF reference list >

VIEW POINT	PSF	remarks column
Work that experience is needed	What you should improve it are described.	The improvement idea has already been remembered is described.
Work not remaining in impression		
Work with difficult confirmation of work situation		
. . .		

EXAMPLE for PLOBLEM and ACTION

PROBLEMS(PSF)

ACTION PLAN (対策案)

(a) Consideration to rust is low.

Rust that influences the function institutionalizes the report with Squawk, and treatment.

(b) Because the equipment situation can be understood only in the unit of work and each equipment, it is difficult to develop similar trouble with other work and other equipment horizontally.

It is important to consolidate information to quality assurance members ,and to attempt to do information-sharing from there.

(c) The work when it is dark is inefficient.

The spot lighting is increased to the work when it is dark.

(d) As for the parts washing in the pit, the work efficiency is bad.

The steam washing machine is introduced about the cleaning in the pit.

(3) CHECK

The improvement plan was executed partially of PSFs,
and the effect was investigated.

- EVALUATING METHOD :

(1) Bench mark investigation

(number of man-hour, working hours etc.)

(2) Questionnaire survey to workers

- Effects(working hours , working efficiency, visible etc.)
- Secondary effects other than improvement purpose
- Negative aspects by improvement

PROGRESS of REMEDIATION

■ IMPROVEMENT(c)

- The spot lighting is increased to the work when it is dark.
- 18 works ,” maintenance such as pumps”, was evaluated.

■ EFFECT

- working hours : Working hours has been improved a little. (Reduction in about 10 percent)
- working efficiency or visible : considerably-improved
- Work has improved because it can arbitrarily shine on a necessary part.
- Negative aspects :
There is a possibility of stumbling for the cable on the floor.

■ IMPROVEMENT(d)

- The steam washing machine is introduced about the cleaning in the pit.
- 9 works ,”such as pit clean” , was evaluated.

■ EFFECT

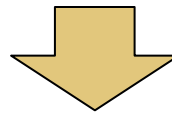
- Working hours has been considerably improved.
→ BEFORE 2,349 minute/times/man AFTER 1,409 minute/times/man
- It is effective in shortening working hours.
- As the negative aspect, the summer time evaporates the dispersing water, and becomes a humidity environment.

Result of Trial

1. The method to investigate PSF with arranged question paper is effective. In this method, we can make clear to safety and reliability problems
2. By the method, we can know the degradation point of facilities, and we can discover the mental workload point for a worker.
3. We can know PSF which was unknown in facilities and it can be proactive human error by improving the PSF.
4. We can know PSF which only a worker's felt. This method improves the communication of a manager to the worker. In addition, it improves safety, reliability, and productivity.

4 . CONCLUSION

- 1 . it was able to discover a factor of the human error by applying PSF management method.
- 2 . Maintenance work became effective by having reduced PSF.



It is effective to apply PSF management method for facilities in JAXA

On the other hand . . .

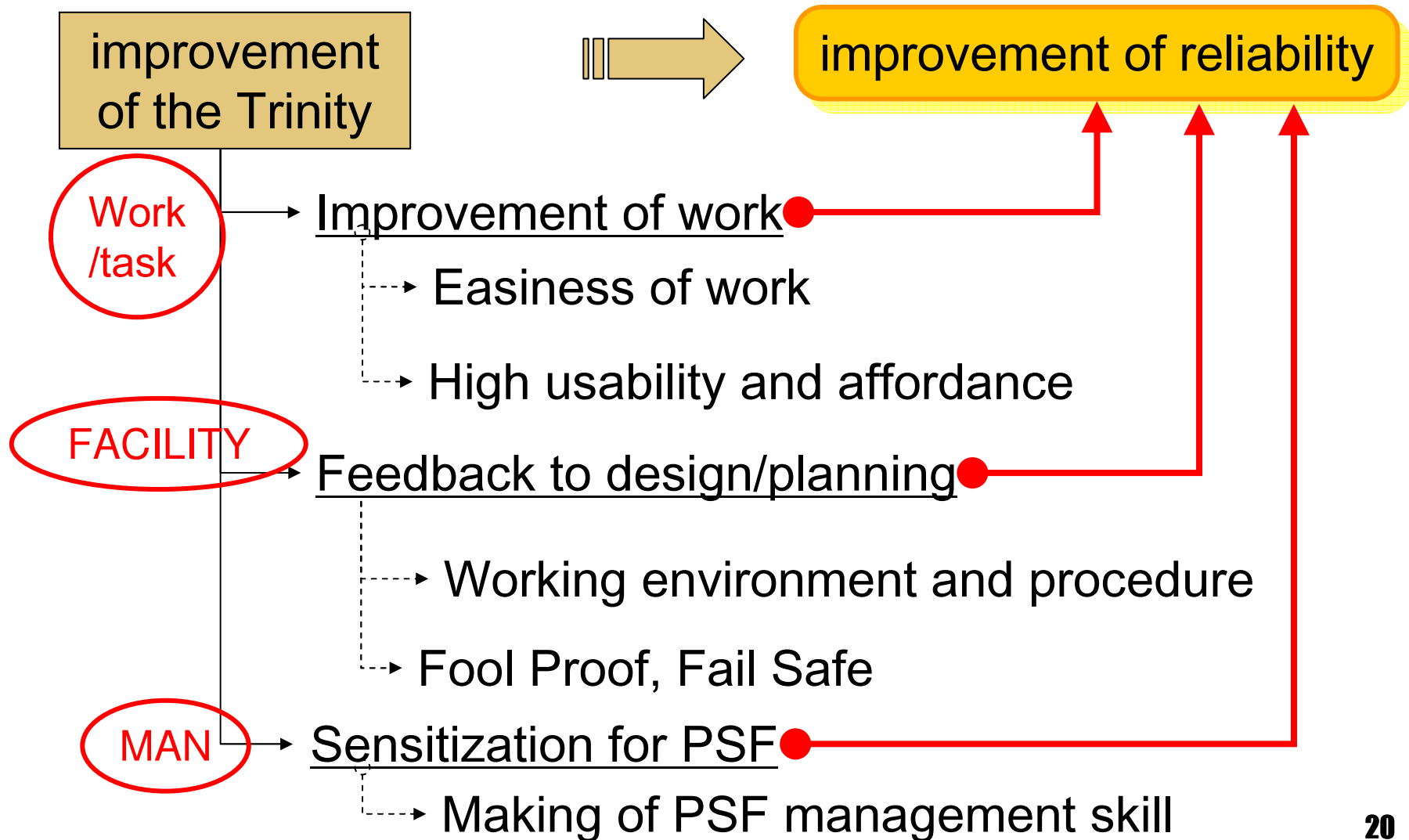
There is a possibility that new PSF is generated by executing the improvement plan.



It is important for reduce PSF to do
"PSF management activity" long-term and continuously.



POTENTIAL of PSF Management



 Thank you for your attention.